

<b>TREATMENT OF NEONATAL HYPOGLYCAEMIA</b>	<b>CLINICAL GUIDELINES</b> <b>Register No: 04219</b> <b>Status: Public</b>
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Contributes to CQC Standards No	C5a

<b>Consulted With</b>	<b>Post/Committee/Group</b>	<b>Date</b>
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Related Trust Policies (to be read in conjunction with)	04071 Standard Infection Prevention 04072 Hand Hygiene 06036 Guideline for Maternity Record Keeping including Documentation in Handheld Records 04266 Diabetes in pregnancy.

Review No	Reviewed by	Review Date
1.0	Dr Lim	July 2006

It is the personal responsibility of the individual referring to this document to ensure that they are viewing the latest version which will always be the document on the intranet

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## **1.0 Purpose of Guideline**

- 1.1 To identify those infants at risk of neonatal hypoglycaemia and develop a co-ordinated treatment strategy to optimise care and outcome.

## **2.0 Equality and Diversity**

- 2.1 Mid Essex Hospital Services NHS Trust is committed to the provision of a service that is fair, accessible and meets the needs of all individuals.

## **3.0 Background**

- 3.1 A transient drop in blood sugar is commonly seen after birth as part of the physiological adaptation to postnatal life. There is no evidence that this is in anyway harmful.
- 3.2 Normal term babies often have hypoglycaemia especially in the first 24 hrs of life but without any sequelae, as they can utilise alternate fuels like ketones and lactate.
- 3.3 No healthy term baby should be investigated for hypoglycaemia unless symptomatic.
- 3.4 Management for such asymptomatic term babies would only be offering regular advice regarding feeding and not include routine supplementary formula feeds.

## **4.0 Operational Thresholds**

- 4.1 An operational threshold is the concentration of blood sugar when a clinician should consider intervention, based on current evidence to provide a safety margin for the baby.
- 4.2 Breast fed term infants may have lower concentrations of blood glucose but higher concentration of ketone bodies than term babies on formulae feeds.
- 4.3 The biological effects of hypoglycaemia vary according to the availability of alternate fuels e.g. ketone bodies, lactate, amino acids and according to the presence of other compounding clinical factors like hypoxia, hypercarbia, polycythaemia and hypocalcaemia.
- 4.4 Our definition of hypoglycaemia remains a blood glucose level of <2.6mmol/l.
- 4.5 Blood sugars are measured by using a glucometer suitable for neonatal use. Prior to carrying out the procedure, it is essential to check the expiry dates.

## **5.0 Babies Clinically at Risk of Hypoglycaemia**

- 5.1 Increased demand/ reduced supply:

- Preterm <37 weeks gestation
- Infection
- Asphyxia
- Hypothermia
- Small for gestational age
- Macrosomia birth weight >4.2 kg (>90<sup>th</sup> centile for gestational age)

## 5.2 Hyperinsulinism:

- Maternal diabetes mellitus or impaired maternal glucose tolerance
- Persistent hyperinsulinaemic hypoglycaemia of infancy
- Beckwith Wiedemann Syndrome
- Islet cell adenoma
- Transient neonatal hypoglycaemia

## 5.3 Other conditions include:

- Endocrinopathies
- Cortisol deficiency
- Growth hormone deficiency
- Inborn errors of metabolism

## 6.0 Treatment of Non Symptomatic Infants

6.1 All hypoglycaemic babies need to be reviewed by a paediatric doctor (Refer to Appendix C for postnatal management)

6.2 If blood meter reading (BM) is  $<2.6$  mmol but  $>2.0$ mmol:

- Feed immediately
- Check the BM 30 minutes after the feed. All readings should be recorded on the neonatal blood glucose observation chart and documented accurately in the postnatal health care records (Refer to Appendix D)
- If  $>2.6$  then the baby should stay on the postnatal ward with its mother
- Feed every 3 hours at correct mls/kg/day, may be increased to the next day on the neonatal feeding regime i.e. from 40ml/kg day 1, to 60mls/kg
- Should not be increased by more than one day ahead without consulting a paediatric registrar.
- Pre-feed the BM should be performed until there have been 2 readings  $>2.6$ mmol
- If the post feed the BM is still low, the practitioner should refer the baby to the paediatric registrar
- Consider enteral feeds at more frequent intervals before considering intravenous 10% Dextrose

6.3 If the BM is 1.5 - 2.0 mmol/l and baby is not symptomatic:

- Check laboratory glucose
- Admit to the neonatal unit (NNU)
- Feed immediately according to the next day on the neonatal feeding regime at more frequent intervals than 3 hourly if necessary
- If the BM is persistently low then consider intravenous infusion of 10% Dextrose

6.4 If B.M 1.0-1.5 mmol and baby is not symptomatic:

- Check lab glucose
- Admit to the NNU
- Start on 90ml/kg/day of 10% Dextrose intravenously with a view to commence enteral feedings as quickly as possible and the BM being stable.

## **7.0 Symptomatic infants**

7.1 Specific symptoms include:

- Seizures
- Coma

7.2 Non-specific symptoms include:

- Jitteriness
- Poor feeding
- Irritability
- Tachypnoea
- Floppy

7.3 All symptomatic hypoglycaemic babies should be reviewed immediately.

7.4 If the BM is  $<1.0$  treat as symptomatic

7.5 If any baby has symptomatic hypoglycaemia, act on the following:

- Check the laboratory glucose
- Admit to the neonatal unit (NNU)
- Commence an intravenous infusion of 10 % Dextrose at 90ml/kg/day after a bolus of 5ml/kg bolus of IV10% Dextrose.

7.6 Enteral feeds should be continued as tolerated (unless contraindicated) and normoglycaemia maintained with intravenous 10% Dextrose.

7.7 If the BM is persistently low or for babies who are fluid restricted, these cases may require higher concentrations of glucose infusion. If the glucose infusion concentration is  $>12.5$ , then use of central line is essential.

7.8 If hypoglycaemia is persistent and central access is not obtained then consider Glucagon 100 micrograms/kg intramuscularly/intravenously.

7.9 If hypoglycaemia (BM  $< 2$ mmol/l) persists in spite of the above interventions then collect a 5ml blood in plain bottle for future tests – growth hormone, insulin, cortisol and amino acids. Furthermore, a urine sample for organic and amino acid screen should be obtained.  
(Refer to Appendix A)

7.10 In babies with symptomatic hypoglycaemia calculate the glucose requirements in mg/kg/minute.  
(Refer to Appendix B)

## **8.0 Staff and Training**

8.1 All medical, midwifery and nursing staff involved in the care of infants at risk of hypoglycaemia will be trained to identify the symptoms of hypoglycaemia and its treatment. This will be recorded as part of their appraisal.

8.2 All staff will be aware of the correct equipment to use and the correct way to perform heel pricks to obtain a capillary blood sample.

- 8.3 All midwifery and obstetric staff must attend yearly statutory training which includes skills and drills training.
- 8.4 All midwifery and obstetric staff are to ensure that their knowledge and skills are up-to-date in order to complete their portfolio for appraisal.

## **9.0 Infection Prevention**

- 9.1 All staff should follow Trust guidelines on infection control by ensuring that they effectively 'decontaminate their hands' before and after each procedure.
- 9.2 All staff should ensure that they follow Trust guidelines on infection prevention. All invasive devices must be inserted and cared for using High Impact Intervention guidelines to reduce the risk of infection and deliver safe care. This care should be recorded in the Saving Lives High Impact Intervention Monitoring Tool Paperwork (Medical Devices).

## **10.0 Audit and Monitoring**

- 10.1 The risk management lead will review all risk event forms and complaints. Any immediate training or educational issues relating to lack of compliance with this guideline will be addressed on a one to one basis.
- 10.2 All incidents and trends analysis will be reviewed at the Maternity Risk Management Group meeting.
- 10.3 Audit of compliance with this guideline will be undertaken annually in accordance with the Maternity annual audit work plan. The Audit Lead in liaison with the Maternity Risk Management Group will identify a lead for the audit.
- 10.4 A review of 40 sets of health records will assess compliance with the guideline.
- 10.5 The findings of the audit will be reported to the Risk Management Group and an action plan developed to address any identified deficiencies. Performance against the action plan will be monitored by this group on a monthly basis.
- 10.6 A survey will be undertaken by the Lead Midwife for Guidelines and Audit, at least annually, to establish staff awareness of how policies should be accessed and the document management process. Any deficiencies identified will inform the staff training programme.

## **11.0 Guideline Management**

- 11.1 As an integral part of the knowledge, skills framework, staff are appraised annually to ensure competency in computer skills and the ability to access the current approved guidelines via the Trust's intranet site.
- 11.2 Quarterly memos are sent to line managers to disseminate to their staff the most currently approved guidelines available via the intranet and clinical guideline folders, located in each designated clinical area.
- 11.3 Guideline monitors have been nominated to each clinical area to ensure a system whereby obsolete guidelines are archived and newly approved guidelines are now downloaded from the intranet and filed appropriately in the guideline folders. 'Spot checks' are performed on all clinical guidelines quarterly.

11.4 Quarterly Clinical Practices group meetings are held to discuss 'guidelines'. During this meeting the practice development midwife can highlight any areas for further training; possibly involving 'workshops' or to be included in future 'skills and drills' mandatory training sessions.

## **12.0 Communication**

12.1 A quarterly 'maternity newsletter' is issued and available to all staff including an update on the latest 'guidelines' information such as a list of newly approved guidelines for staff to acknowledge and familiarise themselves with and practice accordingly.

12.2 Approved guidelines are published monthly in the Trust's Staff Focus that is sent via email to all staff.

12.3 Approved guidelines will be disseminated to appropriate staff quarterly via email.

12.4 Regular memos are posted on the 'Risk Management' notice boards in each clinical area to notify staff of the latest revised guidelines and how to access guidelines via the intranet or clinical guideline folders.

## **13.0 References**

Neonatal Hypoglycaemia Guidelines (2003) Mid Essex Hospitals NHS Trust Paediatric Department.

Neonatal Hypoglycaemia Guidelines (2006) Guys and St Thomas Hospital.

Neonatal Hypoglycaemia Guidelines Hammersmith Hospital NHS Trust (2007)

A Table to illustrate Specific Investigations

Blood	Urine
Glucose, Capillary Ph, Pco <sub>2</sub> , Hco <sub>3</sub> , B.E. Acylcamitines Lactate Ketone bodies Fatty acids Insulin Cortisol Glucagons Growth hormone Amino acids (ammonia if hyperinsulinism) galactose-1-phosphate uridyl transferase	Organic Acids Ketones (dip urine)

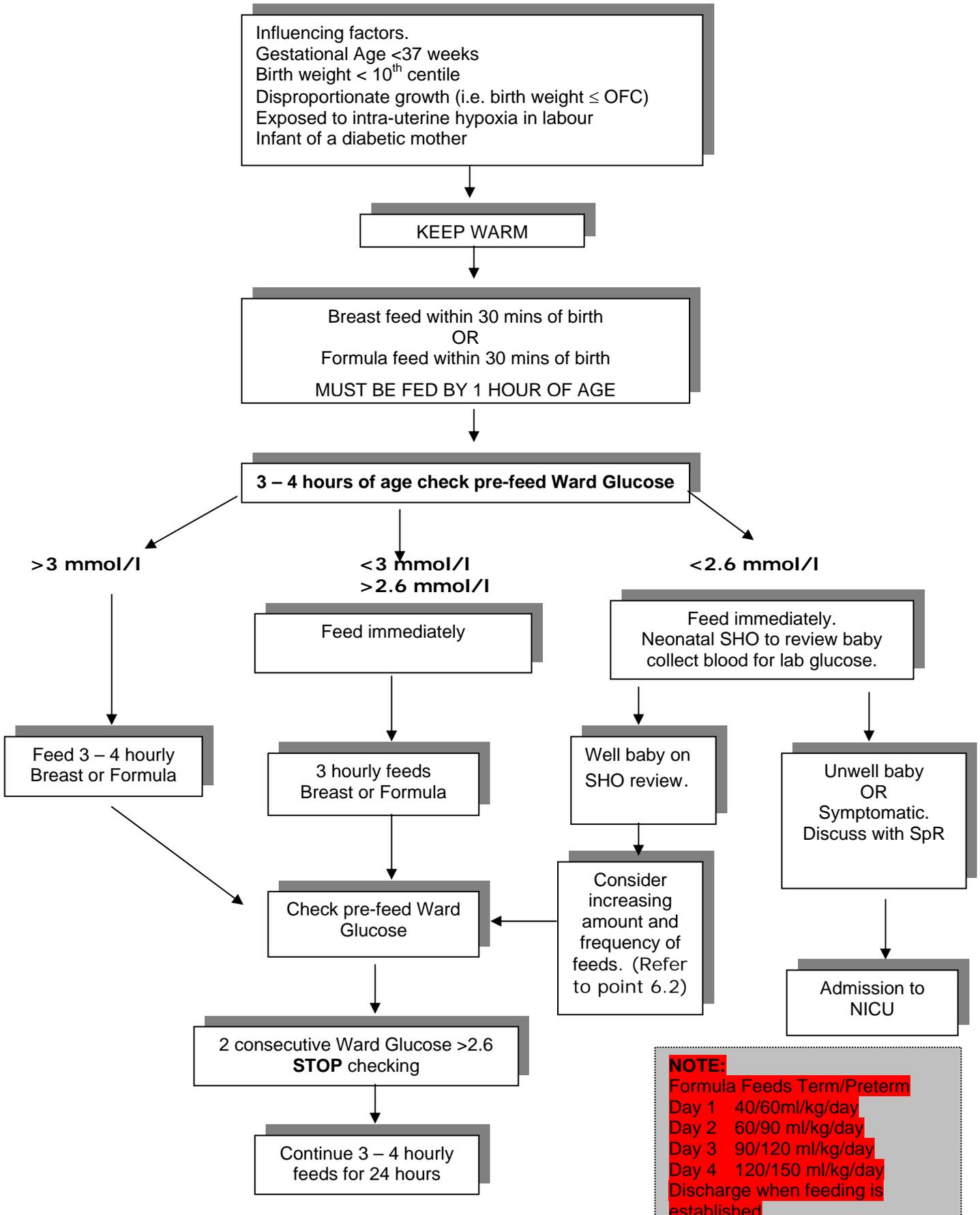
Chart for conversion of rate of glucose infusion from mL/kg/24 hours to mg/kg/min depending on strength of dextrose solution

Infusion rate mL/kg/24h	Strength dextrose solution mg/kg/min			
	4%	10%	15%	20%
60	1.7	4.2	6.2	8.4
80	2.2	5.6	8.3	11.2
90	2.5	6.3	9.4	12.5
100	2.8	6.9	10.4	13.8
120	3.3	8.3	12.5	16.6
150	4.2	10.4	15.6	20.8
180	5.0	12.5	18.7	25.0
200	5.6	13.9	20.8	27.8

If the baby is already on intravenous fluids ensure that glucose intake is adequate:  
 Term AGA (appropriate for gestational age): 3-5mg/kg/min  
 Preterm AGA: 4-6mg/kg/min  
 SGA (small for gestational age): 6-8mg/kg/min

**Postnatal Ward Management**

**Definition: True Whole Blood Glucose <2.6 mmol/l**



**NOTE:**  
 Formula Feeds Term/Preterm  
 Day 1 40/60ml/kg/day  
 Day 2 60/90 ml/kg/day  
 Day 3 90/120 ml/kg/day  
 Day 4 120/150 ml/kg/day  
 Discharge when feeding is established

**Neonatal Blood Glucose Observation Chart**

<b>Name</b>	<b>DOB</b>	<b>Time of birth</b>	<b>Hosp No.</b>	<b>Ward: Consultant</b>

<b>Time &amp; Date</b>	<b>2 hours of life</b>	<b>4 hours of life</b>	<b>6 hours of life</b>	<b>12 hours of life</b>	<b>24 hours of life</b>	<b>Initials/Comments</b>

**If BM (less than) <2.6mmol/l on any occasion, follow protocol hypoglycaemia see reverse of chart & complete chart below**

Time Date	Indication for BM Monitoring	Pre-feed BM	Feed method BR/BOT/NGT	Calculated feed amount	Total feed amount taken	Post feed BM	Referral time Paediatric team	Comments & Initials

**Feed Calculation & Frequency**

<b>Term</b>		<b>Preterm</b>	
Day 1	40mls/kg/day	Day 1	60mls/kg/day
Day 2	60mls/kg/day	Day 2	90mls/kg/day
Day 3	90mls/kg/day	Day 3	120mls/kg/day
Day 4	120mls/kg/day	Day 4	150mls/kg/day
Day 5	150mls/kg/day	Day 5	150mls/kg/day

From day 5 feeds may be increased by 10mls/kg/day to a maximum of 160mls/kg/day for preterm formula or 200mls/kg/day for EBM or term formula.